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ABSTRACT

This training manual provides information needed to meet the minimum EPA standards for certification as a commercial applicator of pesticides in the agricultural animal pest control category. The text discusses pesticide hazards, application techniques, and pests of livestock such as mosquitoes, flies, grubs and lice. (CS)

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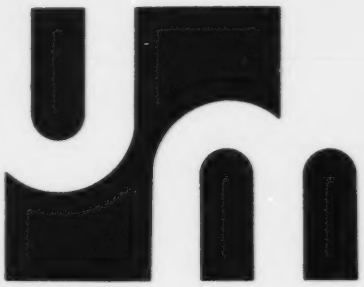

AGRICULTURAL ANIMAL PEST CONTROL

manual 90

This manual was developed in cooperation with The Missouri Department of Agriculture and the Coop Extension Service, University of Missouri.

Assembled by Members of Extension Pesticide Training Team.

SE 024 748

This training manual is intended to provide information needed to meet the minimum standards of the Environmental Protection Agency. It is also intended to prepare you to take an examination for pesticide certification given by the Missouri Department of Agriculture based on this manual. This training will not provide all the information needed for effective Agricultural Animal Pest Control. Additional information in the form of publcations and short courses can be obtained from the University Extension Centers.

This material was adapted to Missouri conditions from a pest control manual developed by the University of Georgia.

AGRICULTURAL ANIMAL TYPES

Many different types of livestock are produced in Missouri--some for food, other, like horses, for the pleasure or companionship they provide. Each type of agricultural animal is attacked by one or more external parasites which normally require control. When control involves the use of pesticides, caution must be exercised to protect man, his food supply and his environment.

PESTICIDES FOR AGRICULTURAL ANIMAL PEST CONTROL

Pesticide Toxicity. Pests can weaken agricultural animals, thereby causing them to be unthrifty, predisposing them to diseases and even causing them to die. Pesticides will protect animals from pests. However, all pesticides are poisons and can be toxic to warm-blooded as well as cold-blooded animals. For this reason, recommended pesticides must be applied properly to prevent injury to animals. (See current Missouri Insect Control Recommendations Handbook.)

Individual animals can show toxicity to certain pesticides and materials contained in pesticide formualtions. Applicators should always be aware of this. Sensitive animals should not be treated or should be treated only with pesticide formulations non-toxic to that animal. Brahman beef cattle or crossbred cattle with Brahman background can show sensitivity to some organic phosphate insecticides. Do not apply organic phosphate insecticides to Brahman background beef cattle when the label warns against it. Poisoning symptoms are usually exhibited as excessive salivation, eye watering, defecation, urination, and muscle twiching.

Animals which are under or about to be put under stress (castration, dehorning, preceeding storms, or preceeding shipping) should not be treated.

Pesticides should not be applied in combination with other medications unless so stated on the label. For example, do not

apply simultaneously two organic phosphates--such as a wormer and a pour-on insecticide. This frequently results in a more severe toxic reactions.

The skin of some horses is extremely sensitive to various pesticide formulations. Before treating horses with pesticides, treat a small patch of skin on each animal with the pesticide formulation approximately 24 hours before the entire animal is treated.

Residue Potential. Most agricultural animals are raised for the human food products they produce. For this reason, it is extremely important that pesticide residues not be allowed to accumulate in illegal amounts in edible tissues. Producers should apply only those labeled insecticides to animals which are being finished for slaughter or are producing edible products such as milk. Some insecticides are eliminated slowly from animal tissues. Other are quickly eliminated. For this reason, strictly adhere to those established intervals between application and slaughter or those established in the use of eggs or milk as human food. These are the reasons label directions should be followed to the letter. Failure to do this can result in animals being confiscated and responsible individuals prosecuted.

PESTICIDE HAZARDS

Pesticide Formulations. Consider the pesticide formulation to be used before the actual treatment of agricultural animals. For example, formulations designed for plant or crop spraying should not be used on animals. Spray application is generally suited for treating most animals. But when temperatures are below freezing it is not advisable to spray to dip livestock. This can predispose them to diseases such as pneumonia. Insecticides applied during very hot, still days may cause damage to treated animals. When applying ready-to-use oil based sprays, be careful not to allow the oil to penetrate the animal's hair so it comes in contact with the skin. Some types of agricultural animals,

especially those having light colored hair coats, may show toxic effects when oils are applied to their skin.

Individual animals can show allergic responses to certain pesticide formulations. Watch for such symptoms as foaming at the mouth, unsteadiness, and troubled breathing. Applicators should know and be prepared to take remedial measures when moderate to severe toxic symptoms occur. This usually involves one or more injections of an antidote. Sensitive animals should not be retreated unless a suitable pesticide formulation can be used. Pour-on or dust formulations are recommended when treating animals in freezing temperatures because they do not add excessive amounts of moisture to the animal.

Pesticide Application Techniques. Apply the pesticide in a manner so it contacts the external parasites on agricultural animals. The choice of a pesticide delivery system depends upon the animal to be treated and the pest to be controlled. For example, when treating animals for lice, mites or ticks, penetration is normally very important. Use 100-200 pounds of pressure when applying pesticides for control of these pests. Most of the commonly used insecticides and miticides destroy only the active or living stages of mites or lice, not the eggs, so retreatment at specified intervals is usually needed to control newly hatched pests.

Apply cattle grub spray treatments so the skin, not just the hair, of the animal becomes thoroughly wet. Spray pressures of 200-400 pounds per square inch are recommended. The desired pressure depends upon the thickness of the animal's coat of hair. Apply treatments after "heel fly" (cattle grub adult) egg laying has been completed. The opportune time for treating native Missouri cattle is sometime between July 15 and September 30.

Power sprayers, knap-sack sprayers, compressed air sprayers and rubbing devices such as back rubbers and face rubbers are satisfactory for applying liquid formulations of pesticides to

agricultural animals. Rubbing devices usually consist of a reservoir and a wick-like material that pulls the insecticide from the reservoir, thereby keeping the rubber saturated. Homemade rubbing devices (Figure 1) normally consist of burlap bags rolled around chains or wire. The insecticide is poured on the burlap to keep it charged. Automatic sprayers, electonically or treadle operated, are commonly used to apply light

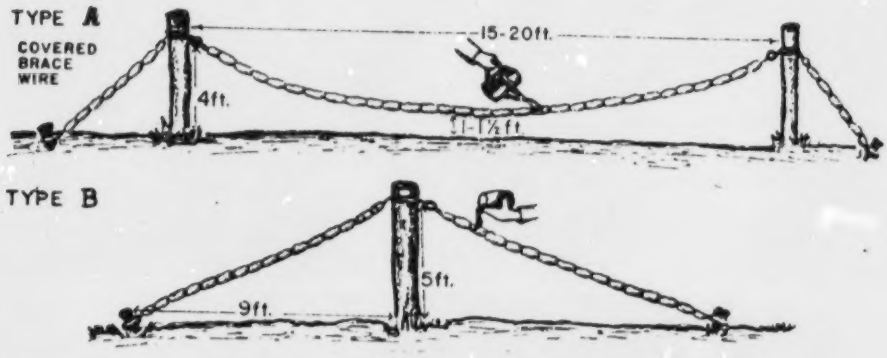

FIGURE 1: Two common types of back rubbers.

dosages of insecticides to animals on a frequent basis. They are usually used to treat dairy animals as they exit milking parlors.

Dust formulations may also be used for control of some external parasites on agricultural animals. They may be applied by hand or in suspended, self-treatment dust bags.

Systemic insecticides are those that are absorbed and translocated throughout most of the animal's body by the circulatory system. They can be applied as pour-ons, spot-ons, sprays, feed additives and in dipping vats. Some systemic insecticides are very effective against cattle grubs, horn flies and lice.

Age and Size of Animals. Even when animals are healthy, their age and size are important considerations when applying pesticides.

With most insecticides, applicators should apply less to small animals and more to large animals. For those pests that require full body coverage, sprays are usually applied to the point of run off. However, systemic insecticides are ready-to-use oil sprays must be applied in exact amounts for adequate control of pests and for the prevention of toxic injury to animals.

Young animals, especially those under six months of age, should not be treated, particularly when information on the pesticide label specifically warns against such application.

Extent of Treatment. Many pests can be controlled with very small quantities of pesticides applied to specific areas on the infested animal. For example, when treating infested wounds on animals, only treat the wound and the immediate surrounding area.

When treating livestock for fly control, it is usually more efficient to treat animals daily with small quantities of pesticides. If self-treating devices, such as back rubbers and dust bags are placed where the animals cannot avoid then, they will treat themselves daily with small amounts of insecticides, thus obtaining good pest control with less material. The application technique that can control pests with the least excitement to treated animals and the least contamination of the environment should be used.

PESTS OF AGRICULTURAL ANIMALS

Agricultural animals are attacked by many different external parasites. Such pests as flies, mites, lice, ticks, bots, and grubs cost producers large sums of money annually. More than $500,000,000 is lost in livestock production in the United States each year. In Missouri estimates put lossess caused by animal pests at several millions annually. These pest losses may result from any one or combination of the following:

1. predispose animals to diseases
2. cause anemia (due to blood loss)
3. reduce weight gains
4. reduce feed efficiency
5. transmit several important animals diseases (encephalitis of horses, anaplasmosis of cattle, heartwork of dogs, etc.)

The following pages list some of the more common pests that attack agricultural animals, the damage they cause, and their habits. An understanding of the biology of the pests to be controlled is necessary for effective, economical and safe pest control.

Mosquitoes. These very common insects have piercing-sucking mountparts, but only the females suck blood from animals. Mosquito larvae must have water in which to live. Any standing or stagnant water is an ideal reproduction site. Adults are usually more abundant in shaded areas. Most damage to animals takes place during early morning, late afternoon and night.

Most mosquitoes spend the winter in the egg stage (Figure 2). However, some species overwinter as adults, others as larvae. When the weather warms, adults become active and mating takes place. From egg laying to adult emergence required 10 days to 3 weeks. Adults normally live about one month. (See following page for Figure 2.)

Most mosquitoes are difficult to control. The larval stage can be destroyed by draining their breeding areas or by applying larvicides. When large bodies of water are infested or when breeding sites are numerous and widely scattered, it is probably not feasible to attempt larval control. Adult control measures usually include frequent applications of insecticides to cover all animal body parts. Frequent applications are required when short residual insecticides are applied unless the population subsides. Sprays are suually most effective. Residual wall sprays can help where animals are confined in stables and barns.

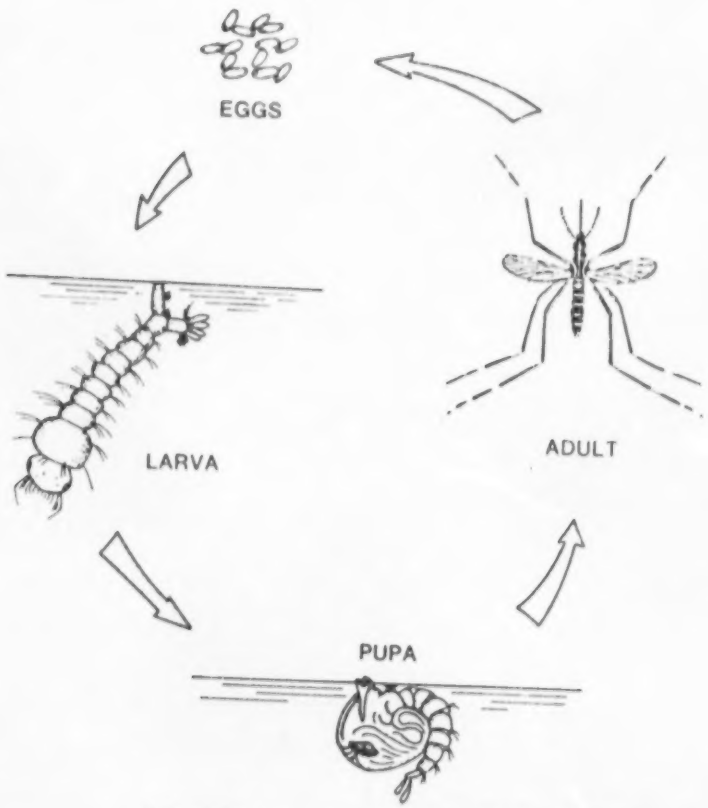

FIGURE 2: Mosquito Life Cycle

Stable Flies. In some animal operations, especially dairies, horse stables and confinement areas, this species is often the most troublesome external parasite (Figure 3). Adult stable flies look like adult house flies, except they have needle-like mouthparts that protrude from underneath the head and are used to pierce the skin and suck blook from animals (Figure 4). Feeding takes place primarily on the legs and lower sides of animals. Flies that feed on the legs are difficult to control because the legs don't retain insecticides for long periods. They only visit animals to feed. Since they are in contact with the animal only a short time, this contributes to difficulty of control.

FIGURE 3: Stable Fly

Stable flies overwinter as pupae in wet straw piles or strawy manure. In early spring adults emerge, mate and soon lay eggs usually in manure mixed with straw. Extreme populations may develop in green chop, etc., causing very high populations on dairy farms. About 20 to 30 days are required for this fly to develop from the egg stage to the adult.

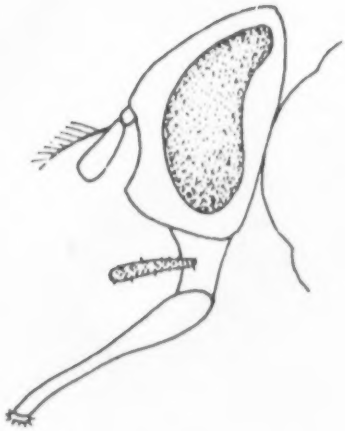

FIGURE 4: Piercing Mouthpart

Sanitation through the prompt removal and spreading of wet straw, strawy manure and other wet, decaying grassy material is the first step in control. However, stable flies have been known to migrate up to 70 miles in only two days so breeding areas could be some distance from the animals. Insecticides can be applied in a number of ways but care must be taken to thoroughly cover the legs and lower sides. Exterior residual wall sprays can destroy stable flies that are resting after taking a blood meal.

Horse Flies, Deer Flies. Horse flies (Figure 5) and deer flies are vicious, persistent, blood-aucking external parasites of animals. If they are not dislodged after alighting on an animal, they cut through the skin with their knife-like mouthparts and suck blood. When they fly away, blood usually flows for a time from the wound. They are efficient transmitters of both cattle and horse diseases.

FIGURE 5: Horse Fly

The larval stages of these two flies may be found in water or wet soil in wooded areas or meadows. Some species require more

than one year to complete development. The winter is passed as larvae in soil around ponds, streams or swampy areas. Adults can fly long distances. They are most troublesome in or near wooded areas.

Fencing animals away from wooded areas and providing artificial shade can help reduce horse and deer fly attacks. Larval control is not feasible due to the large larval breeding areas involved. Repellants or repellants plus a quick acting insecticide appear to be of more value in preventing horse fly feeding than most of the other commonly used insecticides. Although most insecticides may eventually result in death of horse flies, the flies are usually able to complete their blood meal before being affected. Frequent applications are necessary and the flies' ability to fly long distances and to quickly reinfest animals makes control difficult.

House Flies. House flies breed in such organic matter as garbage, animal manure and accumulations of waste feed. As many as 1,000 flies can develop from one pound of suitable breeding material.

House flies overwinter as either full-grown larvae or pupae in or beneath manure or other breeding materials. Some adults may also survive the winter within heated buildings. The adult flies become active in early spring, mate, and females begin egg laying on available breeding materials. From 100 to 150 eggs are laid at a time, with each female laying approximately 500 eggs during her three-to-four-week life span. The eggs hatch in 8 to 30 hours into tiny, white, legless maggots which begin feeding in the breeding material. The maggot stage reaches maturity in one to two weeks and then changes into the pupal or resting stage. A life cycle may be completed in as little as ten days, but usually requires two to three weeks.

House flies have sponging type mouthparts, and therefore, do not

bite animals. It does cause annoyance of animals by alighting on their bodies and serves to transmit certain diseases of animals and man.

Proper sanitation procedures are the first step in house fly control. Insecticides are useful in reducing the house fly problem. Applications of insecticides for adult control may consist of dry or liquid baits, quick known-down sprays and residual wall or resting area sprays. Larviciding breeding materials which cannot be regularly spread is also helpful.

Horn Flies. These pests are serious external parasites of beef and dairy cattle. During the summer months, it is not uncommon for a single animal to have 500 to several thousand feeding or hovering over the back, withers and head. They suck blood and 500 can remove one-half pint of blood daily. They look like stable flies but are only half as large.

Horn flies generally overwinter as pupae in or beneath cattle droppings. When the weather warms, adults begin to appear. They feed, mate and lay eggs on fresh cattle droppings. Development from egg to adult stage requires about two weeks. Adults remain on cattle most of the time. They will leave the animal to deposit eggs and may fly only short distances to infest other nearby cattle.

Since adult horn flies remain on animals during most of their lives, control is relatively easy. Rubbing devices are particularly effective against this pest. Larvae can be controlled by allowing agricultural animals to feed on a systemic insecticide treated mineral, salt or ration mixture. For effective control, animals must consume only the labeled dosages of the insecticide daily.

Face Flies (Figure 6 - see following page). Face flies have recently become a common external parasite on beef and dairy

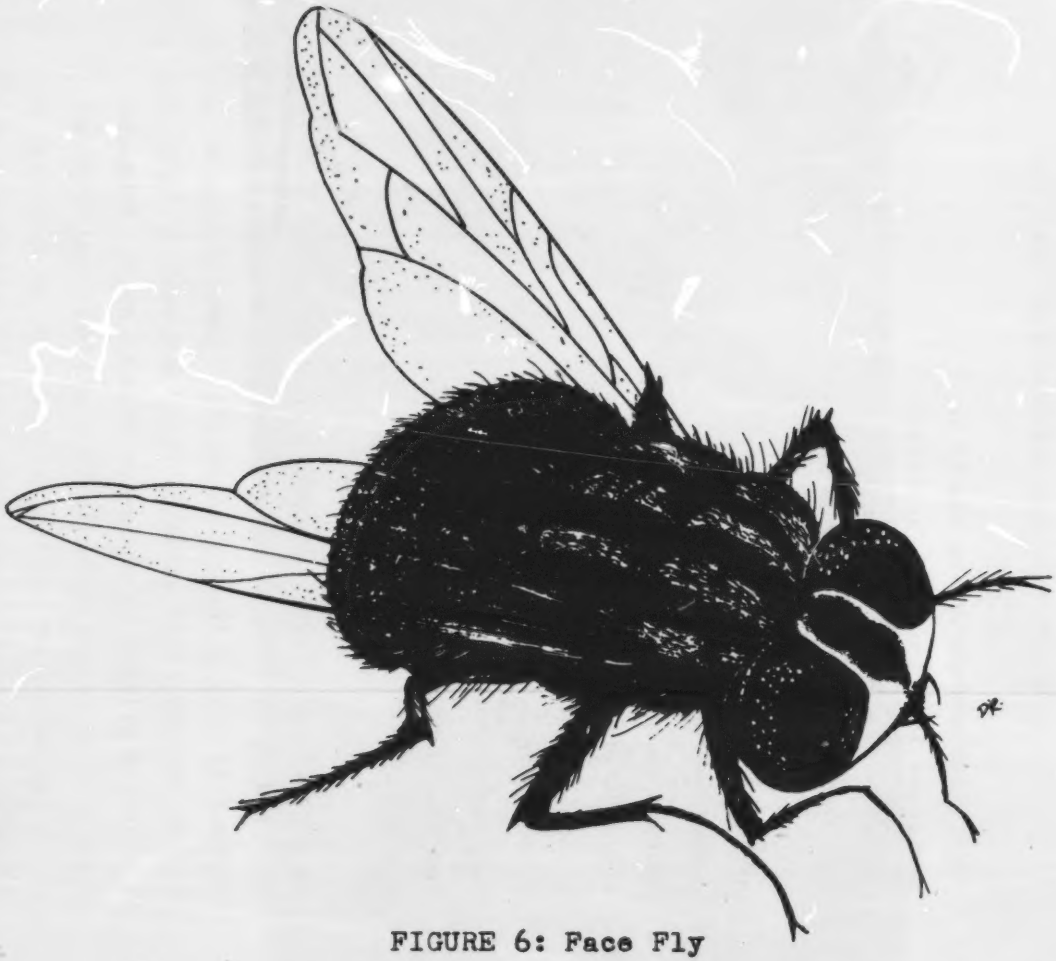

FIGURE 6: Face Fly

cattle and horses throughout Missouri. Adults closely resemble house fly adults but are slightly larger. Face flies are very persistent feeders. They feed upon watery secretions around the eyes, nose, mouth and wounds. Their mouthparts are of the sucking (sponging) type (Figure 7) and they cannot pierce the skin of the host. They are capable of transmitting the organism which causes "pink eye".

Face flies overwinter as adults in protected locations such as attics and within walls of buildings. These adults emerge when the weather warms, mate, and the female lays her eggs only in fresh cattle droppings. The maggots (larvae) develop in the manure, pupate in the adjacent soil and later emerge as adults. A female face fly lays 25 to 50 eggs during her 30-day life. The total life cycle from egg to adult requires two to three weeks.

Figure 7:
Sponging Mouthpart

Since these pests feed primarily upon the animal's face and are capable of flying long distances to reinfest treated herds, control is very difficult to obtain. Insecticides do not adhere readily to an animal's face, and such applications are easily diluted or washed or brushed away. Frequent applications to the animal's face and head are required. Daily forced use of rubbing devices such as dust bags or "face mops" offers a reasonable means of reducing face fly problems.

Wound-Infesting Maggots. Several species of maggots (fly larvae) attack animal wounds causing additional injury and sometimes resulting in death. The females of some of these species lay their eggs on or in wounds. Other species give birth to newly hatched maggots placing them in the wounds. The maggots of these wound infesting species in Missouri feed mostly on dead tissue. Common Missouri species include wool maggots, blowfly maggots and fleshfly maggots.

Constant check of wounds are necessary to detect and reduce damage by wound-infesting maggots. If open wounds are found infested with maggots, larval samples should be submitted to your University Extension center or veterinarian for identification. Treat the wound and surrounding area with labeled insecticides. These spot treatments are most easily applied with aerosols, salves or dusts, although any spray application could be used. Repeat these spot applications as necessary.

Cattle Grubs and Bot Flies. The larval stages of both of these groups of flies are internal parasites of agricultural animals.

Adult cattle grub flies and bot flies resemble bees in shape and color.

The adults of cattle grubs are commonly called heel flies. Adults emerge from the pupal stage in the soil from April into June. The female fly darts in and attaches an egg to the hair of the lower portion of the animal's legs or belly. This annoys the animals, often causing them to run wildly or stand in water. Upon hatching, the tiny grubs burrow through the host's skin and move upward and forward through the tissues of the host. Within about two months, the one-fourth grown grubs are found in the area of the gullet. By late December, the grubs are under the skin along the back. Here they cut a small hole through the skin and remain for another one to two months. When fully grown, they squeeze through the opening, fall to the ground, and form the inactive pupal stage.

Systemic insecticides are usually used for control of cattle grubs. These may be administered as sprays, dips, pour-ons and spot-ons, or as additives to feed or mineral supplements. Treatment should be made shortly following heel fly egg laying, or during late July and August. Cattle should not be treated with systemic insecticides when large numbers of grubs are present in tissues around the gullet and spinal column. If such treatment is done, the cattle often show toxic side effects resulting from the body reabsorbing the numerous dead grubs. In general, most of these insecticides warn that applications should not be used during October, November, and December in Missouri.

The two most common bot flies (Figure 8) in Missouri are the horse bot and the sheep nose bot. Horse bot eggs are usually attached to the hair of the forelegs while the sheep nose bot deposits eggs on or around the lips and nostrils. Horse bots attach to the lining of the digestive tract. Sheep nose bots are usually found in the sinus cavities.

FIGURE 8: Bot Fly

Horse bots may be controlled with systemic insecticides applied as feed additives, or as a drench or bolus given by or under the supervision of a veterinarian. No highly effective control of sheep nose bots has yet been found.

Lice. Lice which attack animals are of two types--blood-sucking or chewing (Figure 9). Blood-sucking lice are more prevalent on beef cattle, dairy cattle, hogs and horses.

They cause damage by irritating animals when they pierce the skin with their mouthparts and by removal of blood. They cause infested animals to produce less, lose weight and eventually become unhealthy. Heavy populations of blood-sucking lice can cause severe anemia.

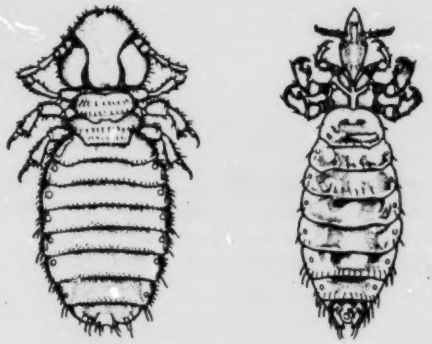

FIGURE 9: Livestock Lice

Chewing lice are more prevalent on poultry, although most agricultural animals have their own chewing louse parasite. Their chewing on the skin results in a scab-like injury.

Lice are most abundant during the cold months when the hair coat becomes thick and long and the skin is relatively free to oil. During these months, all growth stages of lice are easily found on infested animals.

Eggs (nits) are attached to hairs. Hatching occurs in a few days. The young louse feeds, molts and reaches maturity in about three weeks. Each female produces about 20 eggs, thus heavy populations can build up rapidly. When the winter hair coat is shed in the spring lice seem to disappear and don't build up again until cold weather approaches.

Since most insecticides that are applied for louse control do not kill the egg stage, two applications are usually needed about 14 days apart. Some few, long residual insecticides may remain for

sufficient periods to control newly hatched lice. Penetration of the animal's hair coat is essential for effective control with either spray or dust applications. Pour-on applications of systemic insecticides are helpful when treating infested animals in cold weather.

Mites. Many species of mites attack animals (Figure 10). Every types of livestock and poultry has at least one species of mite which depends upon it for existence.

Mites range in size from the visible, red colored poultry or chicken mite to the tiny mange or scabe mites which are invisible to the naked eye. Skin scrapings are usually needed for positive identification of mange or scab mites.

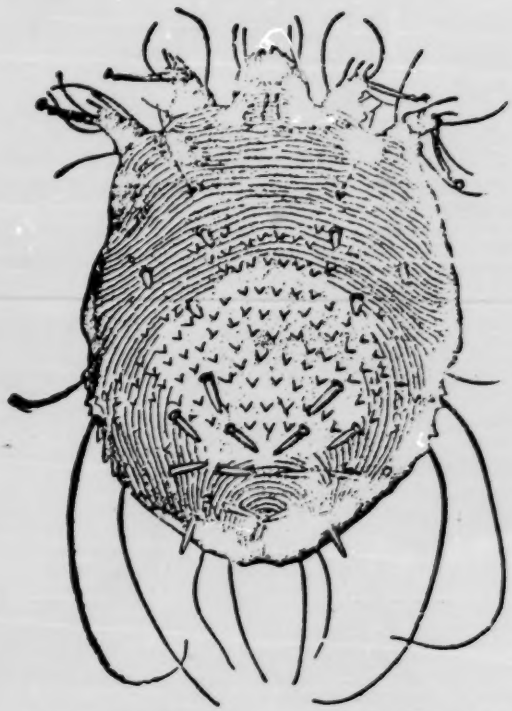

FIGURE 10: Sarcoptic Mange Mite

Some mites cause damage by burrowing into the animal's skin, sucking blood and discharging an irritating fluid while they feed. Bacteria may invade their burrows causing further damage. Other mites remain on the surface of the skin and suck blood with their piercing-sucking mouthparts. Completion of a life cycle for several species requires less than four weeks.

State and federal laws require that all cattle and sheep infested with scabies (scab mites) be quarantined. These animals must be isolated until the infestation is completely destroyed. All infested animals must be treated (usually dipped) with specified insecticides and/or miticides performed under the direct supervision of a State or Federal Veterinarian. Nearly every infestation requires at least two treatments spaced two weeks apart. Severe cases may respond slowly to treatment.

Ticks. Several species of ticks (Figure 11) attack agricultural animals. They are usually more abundant in wooded areas and along animal paths. Most mature ticks are fairly large, about one-eighth to one-quarter inch long, flattened, leathery, eight-legged blood-sucking external parasites.

Both males and females suck blood. After feeding, engorged females deposit thousands of eggs on the ground. The eggs hatch in two to three weeks and the six-legged larvae or "seed ticks" find a host and attach themselves. After feeding, they drop from the host, shed their skin and become eight-legged nymphs. The nymphs feed, drop off, molt, and repeat this process two or three times before becoming adults. The entire life cycle can be completed in 30-40 days under very favorable food and temperature conditions but usually requires the greater part of a year.

FIGURE 11: Tick

The more common species attacking livestock in Missouri include the lone-star tick and the American dog tick.

Control can be obtained by thoroughly covering animals with spray or dip applications of insecticides. Penetration of the hair coat is essential. Removal of heavy vegetation and fencing cattle away from wooded areas will reduce infestations.

References. University of Missouri-Columbia, Extension Agriculture Guide Sheets:

- G 2853 - External Parasites of Horses
- G 7000 - Recommendations for Fly Control on Dairy Cattle
- G 7001 - Fly Control in Dairy Buildings
- G 7010 - Recommendations for Fly Control on Beef Cattle
- G 7011 - Beef Cattle Lice Control Recommendations
- G 7012 - Making and Using a Cattle Backrubber
- G 7020 - Recommendations for Controlling External Parasites on Swine
- G 7030 - Recommendations for Fly Control in Caged Layer Buildings
- G 7388 - House Fly Control in and Around the Home
- G 7389 - Face Flies and Cluster Flies in Houses - Prevention and Control
- G 7500 - Safe Use of Insecticides

University of Missouri-Columbia, Extension Publication MX3 - Missouri Insect Control Recommendations Handbook (Current year's edition)

Guides, available free in single copies from your local Extension Office, can be ordered from the Publications Office, 205 Whitten Hall, University of Missouri-Columbia 65201. MX3-Missouri Insect Control Recommendations Handbook also is available from the Whitten Hall Publications Office.

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